**Earth Rotation: An Interdisciplinary Approach to Earth System Science**

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The study of Earth rotation encompasses the complex nature of orientation changes, the excitation of these changes and their geophysical implications in a broad variety of areas. Earth system studies have embarked on a new era with the advent of highly accurate space geodetic techniques and the increasing availability of complementary geophysical data sets. Techniques utilized include laser ranging to the Moon and artificial satellites (LLR and SLR), very long baseline interferometry (VLBI) and the newly developing GPS technology, The measurements reveal minute but complicated changes of up to several parts in $10^8$ in the speed of the Earth's rotation, corresponding to several milliseconds in the length of the day (LOD). Intercomparisons indicate that Earth rotation is now routinely determined at the 0.03 millisecond (ins) level for UT1 (approximately -1.4 cm at the equator) with higher accuracy being achieved in some cases. Many geophysically interesting variations are detectable at these levels.

Highly accurate observations of Earth rotation provide a unique and truly global measure of natural and man-made changes in the atmosphere, oceans, and interior of the Earth. The principle of conservation of angular momentum requires that changes in the Earth's rotation must be manifestations either of (a) torques acting on the solid Earth, or (b) changes in the mass distribution within the solid Earth, which alter its moment of inertia, Torques arise from angular momentum transfer between the solid Earth and the fluid regions (the underlying metallic core and the overlying hydrosphere and atmosphere) with which it is in contact, Changes in the inertia tensor of the solid Earth are brought about not only by interracial stresses and the gravitational attractions associated with astronomical objects and mass redistributions in the fluid regions of the Earth, but also by processes that redistribute the material of the solid Earth, such as earthquakes, postglacial rebound, and mantle convection. Geodetic observations of Earth rotation changes provide insights into these geophysical processes, which are often difficult to obtain by other means.

1. 1993 AGU Fall Meeting

2. 001310361 (AGU)

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4. G

5a. Bowie Lecture

5b. 1239 Rotational Variations
1294 Instruments and Techniques
1299 General or miscellaneous

6. Oral

7, Invited Review Paper (30%)

8. Charge $S0 to Master Card 5286-3056-83%4492, expires 9/96

9. Invited (by W. Prescott, Geodesy Program Chair)

10. None

11. No